Test Procedures for Distribution Transformers

SNOPR Public Meeting

Alternative Efficiency Determination Method (AEDM)

Building Technologies Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

September 27, 2004

Overview of Alternative Efficiency Determination Method

- Two Methods for Determining Efficiency
- Purpose and Characteristics of an AEDM
- Limitations on Application of an AEDM
- Criteria for Substantiation of an AEDM
- Basic Model Selection for AEDM Substantiation
- Additional Requirements for use of an AEDM
- Comment and Discussion on AEDM

Two Methods for Determining Efficiency

1. Test a sample of units of a basic model (as discussed in the Sampling Plan for Compliance Testing)

2. Calculate efficiency through use of the Alternative Efficiency Determination Method (AEDM)

Purpose and Characteristics of an AEDM

- **Purpose: to reduce the testing burden on manufacturers**
  - **An AEDM can be used to predict the energy performance**
  - **Basic Models rated through the application of an AEDM need not be tested**
- **Characteristics:**
  - **A computational method such as a software design tool that predicts the energy consumption characteristics of one or more basic models**
  - **Derived from a mathematical model that represents the electrical characteristics of a basic model**
  - **Based on engineering and statistical analysis, computer simulation or modeling, or other analytic evaluation of performance data**

Limitations on Application of an AEDM

- The accuracy and reliability of an AEDM must be substantiated before it may be used to determine the efficiency of basic models
- A particular AEDM may be applied only to rate basic models in one of the following groups of distribution transformers:
  - liquid-immersed transformers
  - low-voltage dry-type transformers
  - medium-voltage dry-type transformers
- An AEDM cannot be used to rate basic models that a manufacturer has tested

Criteria for Substantiation of an AEDM

- Five or more basic models tested using the DOE test method
- Five or more units must be tested for each basic model
- The predicted losses must be within +/– 5 percent of the measured losses for each basic model tested
- The average of the predicted losses must be within +/- 3 percent of the average measured losses

Basic Model Selection for AEDM Substantiation

- Two of the basic models must be among the five basic models with the highest unit volumes of production in the prior year
- No two basic models should have the same combination of power (kVA) and voltage ratings
- At least one basic model should be single-phase and at least one should be three-phase

Additional Requirements for use of an AEDM

- Periodic verification of an AEDM - testing by an independent testing lab or verification by independent professional engineer
- Maintenance of Records – method(s) used, data showing basis for AEDM substantiation and verification, and calculations for each basic model for which an AEDM was used to determine efficiency
- Department may ask that a manufacturer conduct simulations on particular basic models, provide analyses of previous simulations, and/or conduct sample testing on select basic model

Other Issues?

- Stakeholders are invited to comment on the use of AEDM in the Department's Test Procedure
- Comments are sought on:
  - the limitations on application of an AEDM
  - the criteria for substantiation of an AEDM
  - the accuracy and reliability of an AEDM
  - selection of basic models

How to Submit Comments

- Public Meeting – all oral comments today will be captured in the transcript and become part of the public record.

- Written comments – SNOPR comment period open until Nov. 8, 2004. Reference docket #: EE-TP-98-550 and/or RIN 1904-AA85

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